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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/939,848	08/27/2001	Guy T. Blalock	3578 . 1US (92-555.1)	3166

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EXAMINER	
LEURIG, SHARLENE L	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 01/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/939,848	BLALOCK ET AL.	
	Examiner	Art Unit	
	Sharlene Leurig	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 August 2001 and 30 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. The amendment filed on November 7, 2003 has been entered and acknowledged by the Examiner. Claims 1-26 have been amended.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1, 7, 11 and 19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 7 disclose a field emission tip having a periphery with a vertical sidewall portion and an inclined sidewall portion surrounding the vertical sidewall portion. Claims 11 and 19 disclose a field emission array having a tip comprising a periphery having a first portion which is perpendicular to the substrate and a second portion oriented at an angle to the substrate, where the first portion surrounded by the second portion. However, "periphery" is defined as "the external boundary or surface of a body" or as "the outward bounds of something as distinguished from its internal regions or center". Figures 4, 9 and 15, which were cited by the applicant as the places in the specification that disclose

such a structure, show a field tip emitter having a first vertical sidewall portion surrounded by a second inclined sidewall portion, but where the first vertical sidewall portion cannot be considered to be a periphery because it is surrounded by the second inclined sidewall portion and therefore is not part of the external boundary of the structure.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 7, 11 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: in claims 1 and 7 both the "vertical sidewall portion" and the "inclined sidewall portion" are described as being the periphery of the field emission tip. In claims 11 and 19 a "first portion" of the emissive tip is described as being part of the periphery but is surrounded by a "second portion". If periphery is defined as "the external boundary or surface of a body" or as "the outward bounds of something as distinguished from its internal regions or center", it is unclear how both elements could be part of the periphery and yet one element could be surrounded by the other.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-4, 11-16 and 19-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Jones et al. (5,647,785).

Regarding claim 1, Jones discloses a field emission tip comprising at least a semiconductive material and a conductive material (column 8, lines 21-32). The structure includes a periphery with a vertical sidewall portion (Figure 6I, element 12a), an inclined sidewall portion (44) surrounding the vertical sidewall portion and an apex (42) at the top of the structure.

Regarding claim 2, the height of vertical portion exceeds a width of the structure.

Regarding claims 3 and 4, the apex comprises a low work function material such as tantalum nitride (column 8, lines 21-22).

Regarding claim 11, Jones discloses a field emission array comprising a substrate (11 and 17), and at least one pointed tip protruding from the substrate, the tip comprising at least one of a semiconductive material and a conductive material (column 8, lines 21-32) and including a periphery. The periphery has a first portion (12a) oriented perpendicularly relative to the substrate and a second portion (44) oriented at an angle relative to the substrate and surrounding the first portion.

Regarding claims 12 and 20, at least a portion of the periphery (44, 12a) is adjacent the substrate (11, 17).

Regarding claims 13 and 21, a height of the portion of the periphery relative to the substrate exceeds the width of the pointed tip.

Regarding claims 14, 15, 22 and 23, a top portion of the pointed tip (42) comprises a low work function material such as tantalum nitride (column 8, lines 21-22).

Regarding claims 16 and 24, since the tips are etched in the final stages of production and there is no disclosed step of removing the waste product of the etching (column 8, lines 50-52), and furthermore because removal of waste products is often imperfect, redeposition material would inherently remain adjacent at least a portion of the periphery.

Regarding claim 19, Jones discloses a field emission display having an anode display screen (column 10, lines 10-13), a cathode spaced apart from the anode display screen, the cathode including a substrate (Figure 8, elements 11 and 17), at least one pointed tip protruding from the substrate, the tip comprising at least one of a semiconductive material and a conductive material (column 8, lines 21-32) and including a periphery. The periphery has a first portion (15a, 26a, 27a) oriented perpendicularly relative to the substrate and a second portion (44) oriented at an angle relative to the substrate and surrounding the first portion. The tip is exposed through a gate (46 and 47), a substantial vacuum is formed between the anode display screen and the cathode (column 9, line 27), and a voltage source is associated with the display screen, the gate and the cathode to provide a potential difference between the cathode and the gate and between the cathode and the anode display screen (column 1, line 35).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 5-10, 17, 18, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al. (5,647,785) in view of Hobart et al. (6,201,342) (of record).

Regarding claims 7, 9 and 10, Jones discloses a field emission tip in an array, with the tip having a structure comprising at least one of a semiconductive and conductive material (column 8, lines 21-32), the structure including a periphery with a vertical portion (Figure 6I, element 12a) and an inclined sidewall portion (44) surrounding the vertical portion, and an apex (42) at the top of the structure made of a low work function material such as tantalum nitride (column 8, lines 21-22).

Jones lacks disclosure of the width of the apex, but discloses the desirability of a low voltage field emission tip (column 8, line 58).

It is well known in the art that narrow emitter tips require less voltage to produce emission.

Hobart teaches a field emitter tip made of tantalum nitride that are 1 nm in width, which fits within the claimed ranges of less than 100 nm or 50 nm.

Therefore regarding claims 5-10, 17, 18, 25 and 26, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the field emitter tip

of Jones to have an apex of less 50 nm in width in order to produce a field emitter tip requiring very low voltage to produce electron emission, and thereby lower the power supply requirements of the device.

10. Claims 16 and 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al. (5,647,785).

Though Jones discloses an etching step of the field emitter tips, the reference does not explicitly disclose the presence of redeposition material in the final product.

However, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jones' field array to have redeposition material present in the final product in order to obviate a removal step of the etching waste product and thereby reduce production time and cost.

Furthermore, because the presence of the redeposition material does not contribute to the functioning of the field emission array, the decision to leave or remove it from the final structure is an obvious matter of design choice.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jones' field array to have redeposition material present in the final product in order to reduce production time and cost, as it is an obvious matter of design choice.

Response to Arguments

11. Applicant's arguments, see Remarks, filed November 7, 2003, with respect to the rejection(s)of claim(s) 1-26 under Hobart et al. (6,201,342) (of record) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Jones et al. (5,647,785).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharlene Leurig whose telephone number is (703)305-4745. The examiner can normally be reached on Monday through Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703)305-4794. The fax phone number for the organization where this application or proceeding is assigned is (703)308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Sharlene Leurig
SL

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